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Witch Flounder in Subdivision 3Ps: A Stock Status Update

by

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[1]This series documents the scientific basis for the evaluation of fisheries resources in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research documents are produced in the official language in which they are provided to the secretariat.

[1]La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

Abstract

Catches from this stock have been generally about 1000 t annually since 1989 with the exception of 1994 which was about 400 t. The reduced catch is largely a result of by-catch constraints of cod and American plaice whose fisheries in Subdiv. 3Ps are under moratoria. Survey biomass indices since 1976 have generally ranged between 2000 and 6000 t with the recent estimates stable at the low end of the range. The maximum age observed in this stock since the early 1970s has been reduced from 22 years old in 1976 to 14 years by 1980 and the overall age structure has been stable since that time. Data from surveys and recent observations from the commercial fishing industry indicate that witch flounder in Subdiv. 3Ps are found in deeper water than in past years.

Résumé

Les prises annuelles en provenance du stock considéré ont été généralement de l'ordre de 1 000 t depuis 1989, sauf en 1994, où elles se sont situées à environ 400 tonnes. Ce fléchissement est dans une large mesure dû aux limites sur les prises accidentelles de morue et de plie canadienne dont la pêche dans la subdivision 3Ps fait l'objet d'un moratoire. Les résultats des relevés de recherche révèlent que depuis 1976 la biomasse s'est en général échelonnée entre 2 000 et 6 000 tonnes, les estimations récentes se stabilisant vers le bas de la fourchette. L'âge maximal observé dans le stock depuis le début des années 1970 est passé de 22 ans en 1976 à 14 ans en 1980 et la structure d'âge générale s'est stabilisée depuis lors. Les données provenant des relevés de recherche et d'observations récentes dans la pêche commerciale révèlent que la plie grise se trouve dans des eaux plus profondes que par le passé dans la subdivision 3Ps.

Description of the fishery

The catches of witch flounder in NAFO Subdiv. 3Ps were about 1000 t annually during the 1960's (Fig. 1). Catches increased to over 4000 t in 1967-69, then declined slowly to former levels in the late 1970's. During the last 10 years, catches have ranged from as low as 300 t in 1983 to as high as 1300 t in 1986. However, since 1989 the average catch has been about equal to the TAC of 1000 t with the exception of 1994 which was only 400 t. During the 1980's the catch was primarily a by-catch of other groundfish fisheries, however, in recent years with the severe declines in major groundfish resources (cod and flatfish species in particular) certain sectors of the fishing industry had come to depend more on this stock.

Catches from this stock have been taken mainly by Canadian trawlers fishing offshore on St. Pierre Bank while there are some catches taken by small Scottish seiners and gillnetters fishing in Fortune Bay off the southcoast of Newfoundland. Prior to the boundary settlement between Canada and France, fishermen from St. Pierre and Miquelon also caught small amounts of witch flounder on St. Pierre Bank although this no longer appears to be the case.

The fishing pattern for offshore Canadian participants during the winter of 1994 appears to have been similar to that of 1993 according to information obtained from industry representatives. Fishing was conducted at the southeastern tip of St. Pierre Bank in depths ranging from 200 to 900 m. As a result of the closure of the American plaice and cod fisheries in Subdiv. 3Ps for 1994, combined with a 5% by-catch constraint, the fishery for witch flounder has been seriously hampered and resulted in the low catch level for 1994.

Research vessel surveys

Stratified-random bottom trawl surveys for groundfish have been conducted by Canada in wintertime on St. Pierre Bank since the early 1970's, however, only since about 1976 has coverage been relatively complete, at least to a depth of 550 m. Biomass estimates have been highly variable over the past 15 years, fluctuating between 2000 and 6000 t and showing little in the way of trends (Tables 1 and 2; Fig. 2). An examination of survey indices by depth zone in 1994 indicated that during the late 1970's and early 1980's there were considerable levels of the biomass in depths less than 183 m (100 fath) whereas during the 1990's there were none (Fig. 3). While surveys from 1993 to 1995 are within the range of past biomass estimates, good fishing occurred in deep water beyond the survey area in 1993 which would lend some support to the hypothesis that witch flounder are mostly distributed in depths not surveyed by the research vessels. On the other hand, the fishery concentrates within a relatively small area on a prespawning concentration of high density which may not be an indicator of a high level of biomass.

Catch at age

Abundance estimates at age from research vessel surveys were available up to 1993 and have shown that in the mid-1970's ages ranged as high as 22 years old, however, this was reduced to a maximum of 14 years old by 1980 (Table 3; Fig. 4). The age structure has remained relatively stable since that time to the present although the abundance indices have shown considerable variation on an annual basis.

Prognosis

Given the high annual variability of the survey biomass indices, it is not possible to provide a precise estimate of stock size. Considering that the 1993 survey estimates are within the range of variation coupled with the success of the 1993 winter fishery, largely outside the survey area, there may not be need for alarm at current catch levels. However, good catch rates are not necessarily an indication of the well-being of the resource when commercial fishing concentrates on high density prespawning aggregations, especially if it occurs in a fairly localized area.

The 1994 and 1995 survey estimates appear stable and also in the range of previous estimates albeit at the low end. Given the catch for 1994, and the anticipated low catch levels for the short term based upon usual harvesting strategies and by-catch constraints, this stock appears to be in little danger of declining in the immediate future at least not as a result of commercial exploitation.

Table 1. Biomass (tons) by stratum of witch flounder in NAFO Subdivision 3Ps from 1976-94.

Depth (fath)	Str.	Area	Units ('000)	Year 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 Feb	1993 April	1994
0-30	314	974	73	0	20	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
	320	1320	99	15	-	-	-	0	0	0	85	0	0	0	0	0	0	0	0	0	0	19	0
31-50	308	112	8	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
	312	272	20	2	19	0	0	-	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0
	315	827	62	0	21	-	0	0	0	25	74	137	0	47	0	31	22	0	0	0	0	0	0
	321	1189	89	61	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	325	944	71	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0
	326	166	12	-	-	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0
51-100	307	395	30	10	66	1	0	13	0	0	11	30	10	8	0	0	0	0	0	0	0	2	25
	311	317	24	236	578	30	35	5	6	0	0	71	13	547	4	36	2	0	1	0	2	0	0
	317	193	14	572	167	101	0	64	2	75	1425	1735	29	58	2	47	0	0	0	17	0	11	0
	319	984	74	92	117	134	67	1392	1219	69	74	154	55	176	156	78	981	-	9	0	0	0	0
	322	1567	118	0	-	0	0	91	0	36	21	52	0	11	0	2	0	0	0	0	0	0	0
	323	696	52	0	4878	8	-	0	196	52	496	20	226	7	98	15	33	0	0	0	0	0	0
	324	494	37	0	-	-	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
101-150	306	419	31	35	101	47	83	54	76	22	104	5	55	87	33	14	39	0	7	2	7	2	13
	309	296	22	42	136	75	88	0	83	0	67	43	104	56	3	8	22	16	20	3	8	41	22
	310	170	13	36	89	85	51	52	77	51	21	41	72	89	20	18	61	44	3	0	17	1	26
	313	165	12	122	103	211	76	275	310	105	126	31	48	46	15	77	107	200	13	77	20	165	451
	316	189	14	77	473	215	266	84	234	-	582	433	527	504	473	1234	451	729	10	847	-	656	114
	318	123	9	18	56	54	136	67	-	9	93	9	-	549	20	217	14	-	658	4	33	548	0
151-200	705	195	15	88	105	58	196	116	183	-	72	55	97	102	102	263	139	56	160	104	33	63	58
	706	476	36	305	735	308	880	357	634	86	404	304	217	451	563	371	165	345	704	471	280	518	283
	707	93	7	23	9	76	78	67	-	-	43	40	-	73	94	30	69	-	886	282	105	118	0
	715	132	10	38	26	90	46	33	23	15	63	22	-	54	50	42	111	16	0	16	5	43	28
	716	539	40	165	337	181	328	147	455	61	202	181	301	670	413	451	430	422	206	278	206	142	116
201-300	708	117	9	121	55	-	38	7	-	-	24	31	-	66	70	33	110	-	1050	73	102	26	109
	711	961	72	901	-	-	-	344	527	213	396	317	353	597	412	289	407	359	366	958	285	340	128
	712	973	73	199	-	-	613	448	749	95	272	-	513	548	256	355	246	207	447	769	294	133	215
	713	950	71	0	-	-	-	307	190	86	177	-	213	399	687	295	314	278	529	558	421	147	214
	714	1195	90	214	-	377	-	407	511	118	118	-	-	1067	393	683	484	484	737	627	238	205	107
301-400	709	96	7	24	-	-	-	-	-	-	1	1	-	-	-	-	47	-	125	-	36	21	4
	710	36	3	0	-	-	-	-	-	-	5	4	3	8	-	2	-	-	7	-	7	-	2
Total				3398	8090	2052	2982	4330	5475	1124	4956	3739	2836	6223	3864	4595	4254	3157	5937	5065	2098	3207	1916
0-30				15	20	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	27	0
31-50				63	40	0	0	0	0	32	74	160	0	47	0	35	22	0	0	0	0	0	0
51-100				910	5806	274	102	1565	1423	232	2027	2061	333	807	260	178	1016	0	10	17	2	12	25
101-150				331	958	688	701	532	780	187	992	562	806	1332	565	1568	694	989	710	932	85	1412	627
151-200				620	1211	714	1529	719	1296	161	784	602	615	1352	1222	1157	914	840	1956	1131	629	883	485
201-300				1436	55	377	651	1513	1977	512	987	349	1079	2678	1817	1654	1561	1328	3129	2985	1340	851	773
301-400				24	0	0	0	0	0	0	6	5	3	8	0	2	47	0	132	0	43	21	6

ANALYSIS FOR TRIP 167 1995 166 1995
VESSEL 30
ICNAF 3P

TABLE 2

SPECIES 0890

WEIGHTS

STRATUM	NO.SETS	TOTAL	AV./SET	UNITS	TOTAL NO	VAR.
306	3	0.00	0.00	27248.	0.	0.00
307	4	0.00	0.00	29650.	0.	0.00
308	2	0.00	0.00	8407.	0.	0.00
309	3	0.00	0.00	22219.	0.	0.00
310	2	0.00	0.00	12761.	0.	0.00
311	3	0.00	0.00	23795.	0.	0.00
312	3	0.00	0.00	20417.	0.	0.00
313	2	0.00	0.00	12386.	0.	0.00
314	7	0.00	0.00	73113.	0.	0.00
315	7	0.00	0.00	62078.	0.	0.00
316	2	4.90	2.45	14187.	34758.	1.13
317	2	0.00	0.00	14487.	0.	0.00
318	2	95.35	47.68	9683.	461651.	4347.78
319	8	3.80	0.47	73863.	35085.	1.81
320	12	1.24	0.10	99085.	10239.	0.13
321	11	0.00	0.00	89251.	0.	0.00
322	13	0.00	0.00	117626.	0.	0.00
323	5	0.00	0.00	52245.	0.	0.00
324	4	0.00	0.00	37082.	0.	0.00
325	7	0.00	0.00	70861.	0.	0.00
326	2	0.00	0.00	12461.	0.	0.00
705	2	0.00	0.00	14638.	0.	0.00
706	4	45.40	11.35	35731.	405542.	145.53
707	2	79.30	39.65	5555.	220246.	158.42
708	2	4.97	2.48	9458.	23503.	10.26
709	2	42.75	21.38	11034.	235861.	374.01
711	5	28.20	5.64	44513.	251054.	1.24
712	7	54.90	7.84	54872.	430353.	46.52
713	8	0.00	0.00	63880.	0.	0.00
714	10	0.00	0.00	78592.	0.	0.00
715	2	0.00	0.00	9608.	0.	0.00
716	5	0.00	0.00	40460.	0.	0.00
779	4	0.00	0.00	31677.	0.	0.00
780	2	0.00	0.00	30251.	0.	0.00
781	3	0.00	0.00	33479.	0.	0.00
782	2	0.00	0.00	13737.	0.	0.00

LOWER CONFIDENCE LIMIT IS LESS THAN
OR EQUAL TO ZERO
****-VARIANCE TOO LARGE FOR VALID
CONFIDENCE INTERVAL AT THIS VALUE OF ALPHA-****

TOTAL	TOTAL UPPER	TOTAL LOWER	AVERAGE MEAN	AVERAGE UPPER	AVERAGE LOWER
2108292.	4456450.	-239867.	1.55	3.28	-0.18

EFFECTIVE DEGREES OF FREEDOM= 2
STUDENTS T-VALUE= 4.30 ALPHA=0.05

Table 3 Abundance estimates ('000s) of witch flounder at age from research vessel surveys in Subdiv. 3Ps from 1976-93.

Age	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 Feb.	1993 April
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-
2	36	4	-	6	116	41	-	18	-	22	-	-	-	-	-	56	14	-	-
3	192	22	-	27	324	676	39	33	14	16	-	18	33	4	-	120	139	-	-
4	445	13	89	116	241	775	477	186	32	85	139	40	74	129	56	100	234	119	155
5	373	108	158	141	499	613	845	697	153	278	572	222	293	266	132	272	271	216	395
6	1298	56	144	149	922	1219	659	1255	562	1472	2957	1049	799	729	421	1037	1406	392	599
7	725	238	194	752	2101	3338	527	2294	1401	1947	4198	2282	4376	1964	2074	3258	4901	1598	2591
8	942	478	340	1355	1728	3590	629	2556	2112	1640	3184	2178	3866	2933	2263	4600	5340	2228	3297
9	2194	776	535	1342	1125	2421	779	2902	2446	878	1920	1616	2092	1775	796	3188	3405	1208	1808
10	2271	1675	803	1520	1111	2190	620	2193	2348	810	1722	1379	1172	1491	530	2050	1386	644	913
11	2184	2174	973	1290	1330	1743	268	1213	962	553	970	1056	997	1210	445	1659	1199	273	368
12	1380	2964	807	784	983	675	292	248	325	562	311	610	431	855	269	1100	304	149	243
13	748	1845	599	293	461	46	212	23	86	191	88	128	87	293	134	430	284	14	67
14	337	1577	483	138	78	9	11	-	18	16	9	-	18	92	87	70	11	-	9
15	242	1000	203	18	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
16	245	508	127	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	55	409	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	93	254	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	28	120	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	35	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	13847	14275	5538	7941	11019	17336	5358	13618	10459	8470	16070	10578	14238	11741	7207	17949	18912	6841	10445

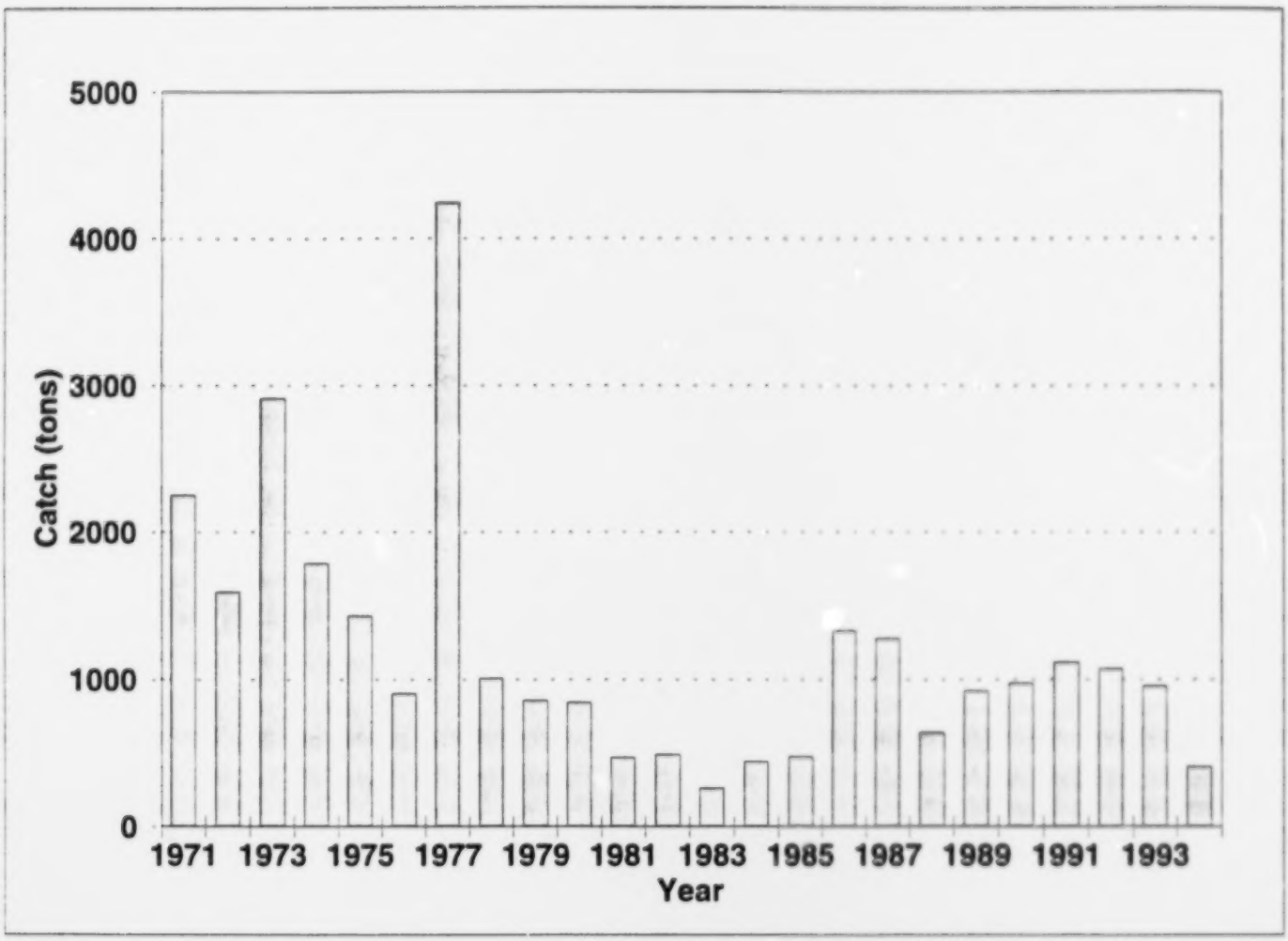

Fig. 1 Commercial catches of witch in Subdiv. 3Ps from 1971-95.

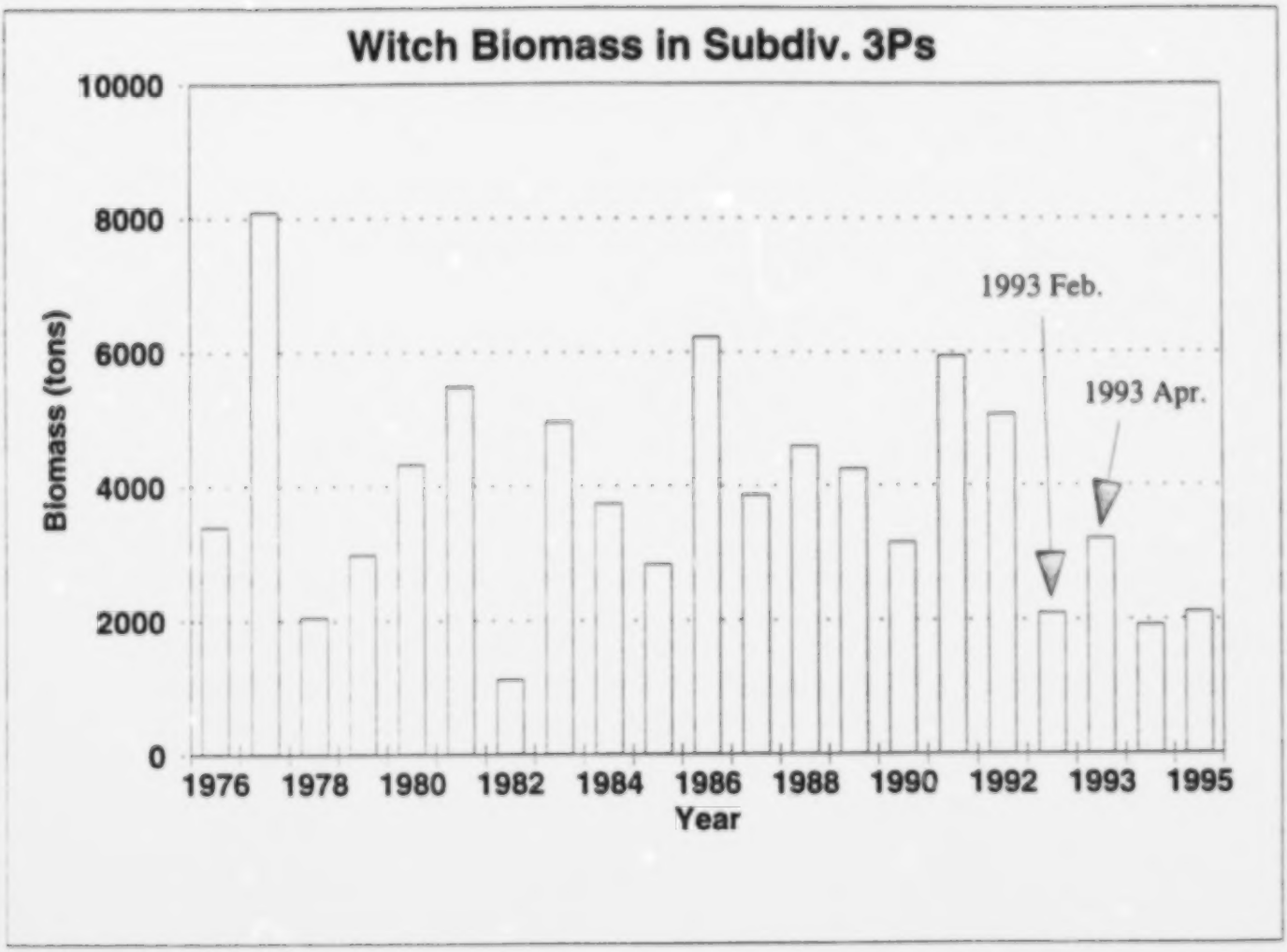

Fig. 2 Biomass estimates of Witch in Subdiv. 3Ps from 1976-95.

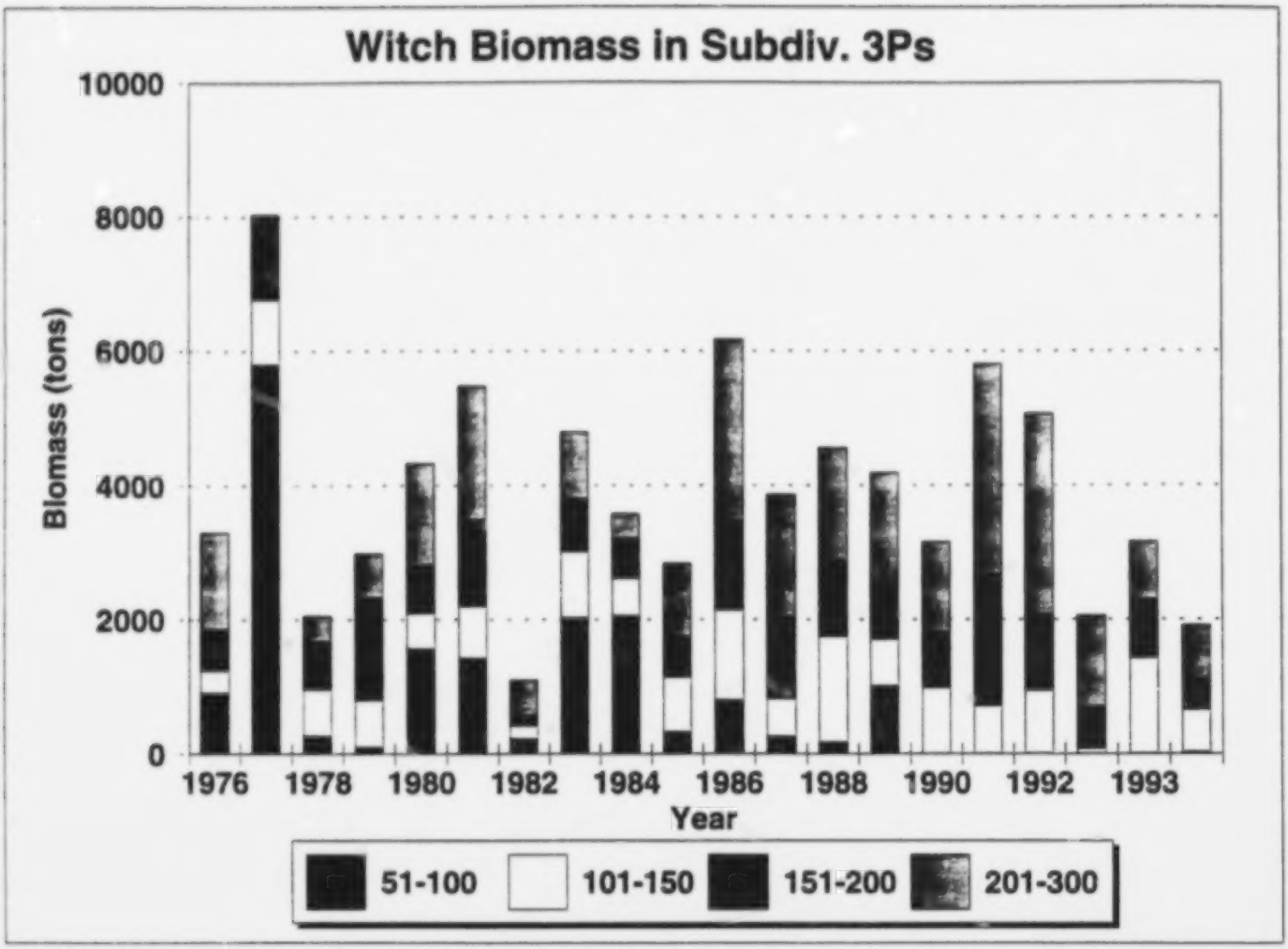

Fig. 3 Biomass estimates of Witch by depth in Subdiv. 3Ps from 1976-94.

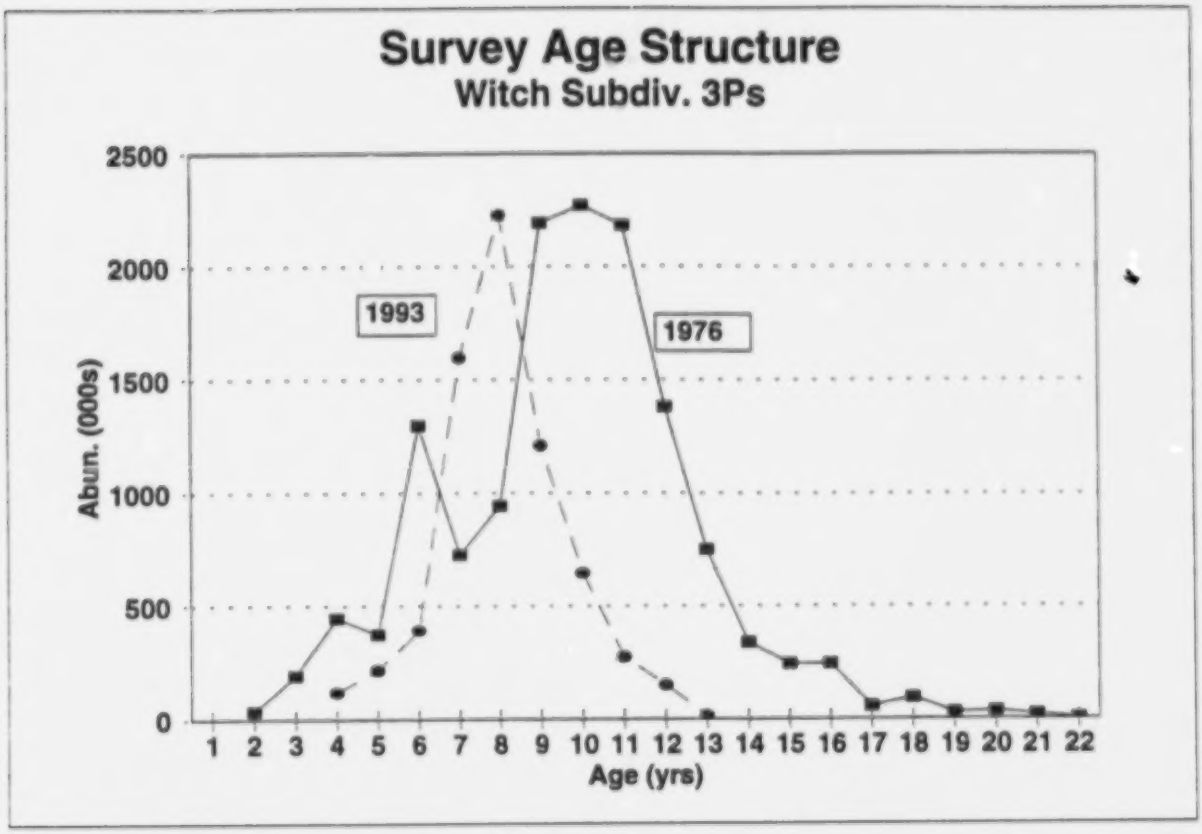

Fig. 4 Comparison of age composition of witch flounder from surveys in Subdivision 3Ps. Only 1976 and 1993 are shown to illustrate change over time.